DIRECT TESTIMONY OF

PETER NARBAITZ

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC. AND

PIEDMONT NATURAL GAS COMPANY, INC.

DOCKET NO. 2021-236-G

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Peter Narbaitz. My business address is 200 Laurier Avenue West, Suite 700, Ottawa, Ontario, Canada.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am Senior Manager in the Energy Markets – Gas team at ICF.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND BUSINESS BACKGROUND.

A. I graduated from the University of Ottawa in 2010 with a Bachelor of Science in Mechanical Engineering. I received a Master of Business Administration from the University of Ottawa in 2018. I am a licensed Professional Engineer in the province of Ontario. I have worked at ICF since 2011, holding varying positions of increasing responsibility. My initial focus at ICF was work related to energy efficiency and greenhouse gases ("GHG") emission reductions in the industrial sector. In 2017, I shifted to a new position at ICF and my focus changed to supporting gas utilities with strategic planning.

Q. PLEASE DESCRIBE YOUR DUTIES RELATED TO RESPONSIBLY SOURCED NATURAL GAS IN YOUR CURRENT POSITION.

A. My career has focused on supporting and managing projects in the fields of energy and climate change, specializing in energy efficiency and strategic planning for utilities. In recent years I have used my technical, financial, and industry expertise to help natural gas utilities shape their role in a lower carbon future. I helped develop business plans for several U.S. gas utilities demonstrating how their distribution infrastructure could be leveraged to meet aggressive GHG emission reduction targets. I have worked with several U.S. gas utilities and integrated utility/energy companies (electric distribution, electric generation, gas distribution) to help them understand their GHG emissions profiles and assess opportunities to reduce these emissions. I have also worked with gas utilities to study emission reduction opportunities in their service territories, develop electrification and decarbonization scenarios, assess their impact on energy demand, and model the potential impacts to utilities and ratepayers. Responsibly Sourced Gas ("RSG") has been a component of these studies, and of the utility plans.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my direct testimony is to provide an overview of RSG, how RSG can assist gas utilities to reduce emissions of GHGs from across the natural gas value chain, and how the RSG market is developing today. I also explain the differences between RSG and Renewable Natural Gas ("RNG") and how both RSG and RNG can contribute to gas utility decarbonization programs.

Q. WHAT IS RSG?

A. RSG is geologic natural gas that has been certified to meet certain environmental performance criteria, such as reduced emissions of GHGs. This can include improved environmental performance all along the natural gas value chain including production, gathering, processing, and transportation. Industry participants have also referred to RSG as Certified Gas and Differentiated Gas.

The RSG certification process allows companies across the value chain to demonstrate that they are achieving real and measurable reductions in their GHG emissions and enhancing the transparency in their emissions reporting. RSG certification also allows companies to distinguish natural gas sourced through a superior environmental footprint from traditionally-sourced natural gas. Certification criteria are typically focused on methane emissions, but some certifications also consider additional qualities such as other GHG and air pollutant emissions or water use.

Q. WHAT IS THE BENEFIT OF PROCURING RSG?

A. Procuring RSG ensures that purchasers are proactively taking actions to minimize GHG emissions associated with natural gas use. By associating a value-added benefit to natural gas produced in the most environmentally responsible manner, companies are

incentivized to see their product as RSG that is produced, processed, and transported using improved technologies to reduce GHG emissions associated with these practices. Also, procuring RSG allows local distribution companies ("LDCs"), power generators, and other consumers of natural gas to source a less GHG-intensive option.

The World Resources Institute and World Business Council for Sustainable Development (WRI/WBCSD) have established widely adopted GHG measurement and tracking protocols. These protocols separate corporate emissions for reporting companies into three categories or "Scopes." Scope 1 is direct emissions from assets owned by the company. Scope 2 is indirect emissions from the generation of electricity or steam purchased by the company. Scope 3 are other emissions associated with raw materials purchased by the company, consumption of products sold by the company, or other indirect emissions not captured in Scopes 1 and 2.

For natural gas utilities, Scope 1 emissions are primarily fugitive or vented methane emissions from the utility system. Methane is the main component of natural gas and is a GHG. Methane has a greater warming effect than carbon dioxide (CO_2). This greater effect is commonly portrayed through the use of a global warming potential ("GWP") that compares the effect of other GHGs to that of CO_2. The GWP is calculated by the U.N. Intergovernmental Panel on Climate Change (IPCC) in periodic Assessment Reports. The U.S. EPA, states, and other international governments currently use the GWPs from the IPCC fourth Assessment Report (AR-4) for their inventory calculations.

CO_2 cycles through the biosphere and has an effectively infinite lifetime. Other GHGs deteriorate over time, so their GWP depends on the time period over which they are averaged. The IPCC calculates GWPs for 100-year and 20-year averaging times. The 100-

year averaging time is typically used by the official national and state inventories. The AR-4 100-year GWP for methane is 25. That is, one ton of methane has the same warming effect as 25 tons of CO_2 over 100 years. This is also expressed as one ton of methane has 25 tons of CO_2 equivalent ("CO_2e").

Because of this multiplier effect, reducing methane emissions is seen as an important component of GHG reduction efforts. Put another way, methane reductions can be highly effective and cost-effective because every ton reduced is equivalent to 25 tons of CO_2e. This multiplier effect also explains why methane emissions are typically the largest component of gas company Scope 1 (direct emissions). That said, the Scope 1 emissions also include CO_2 from combustion of gas in company fleet vehicles, building heating, and gas-fired compressor engines and generators at storage facilities.

Scope 2 emissions related to electricity consumed by the gas utility are typically negligible relative to the Scope 1 emissions. Scope 3 emissions are separated into two categories, upstream and downstream. Scope 3 upstream emissions are related to the production, gathering, processing, and transportation of the gas purchased by the utility company. Scope 3 downstream emissions are related to the utility customer's combustion of gas sold by the utility and are typically the largest component of the gas utility footprint. Hence, the significant industry and stakeholder focus is on lowering gas utilities' Scope 3 emissions.

The indirect Scope 3 emissions for a gas utility are considered direct Scope 1 emissions for another company and/or person, but the gas utility may be best positioned to help reduce these indirect emissions. For example, the upstream Scope 3 emissions for a gas utility are considered direct Scope 1 emissions for its natural gas producers, but a gas

utility may be able to support reductions in producers' emissions through its procurement decisions. In addition to working with upstream suppliers to encourage policies and processes to reduce methane emissions, the procurement of RSG on behalf of their customers is a very impactful way that gas utility companies can support reductions in the upstream GHG footprint of the geologic natural gas they sell to their customers. Given the heightened scrutiny of value chain methane emissions and their contribution to climate change, an increasing number of gas utilities are making corporate commitments to support GHG emission reductions. Accordingly, RSG is coming into focus as a potentially low-cost opportunity to drive upstream GHG emission reductions.

Q. HOW SIGNIFICANT ARE UPSTREAM EMISSIONS TO GAS INDUSTRY EMISSIONS?

A. The EPA Inventory of Greenhouse Gas Emissions[1] is the official U.S. government estimate of national GHG emissions. According to the most recent report (April 2021) the natural gas industry emitted 157.6 million metric tons CO_2e of methane emissions in 2019 as distributed below.

Methane Emissions from the Natural Gas Industry - 2019

Segment	MMTCO2e
Production	53.3
Gathering	40.9
Processing	12.4
Transmission	37.0
LDC	14.0
Total	157.6

Data Source: 2021 U.S. EPA Inventory of U.S. GHG Emissions and Sinks

[1] EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks." Retrieved from: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

In addition to the methane emissions, there are CO_2 emissions from gas combustion in process equipment and gas pipeline compressors as well as CO_2 that is removed from the raw gas and vented to the atmosphere. The combined national emissions for gas production, gathering, processing, and transportation based on U.S. government data sources are approximately 11.4 kg CO_2e/MMBtu of gas delivered to customers (CO_2 and methane). This can be compared to 53.0 kg CO_2/MMBtu for end use combustion of gas (just CO_2). Based on these national numbers, the upstream emissions are roughly 20% of the emissions from gas delivered to customers, however it could be higher or lower depending on the source of gas, hence the opportunity for RSG.

Q. WHAT IS THE POTENTIAL FOR REDUCTION OF UPSTREAM EMISSIONS?

A. There are several opportunities for reducing the upstream emissions that could be incorporated into the purchase of RSG. First is through the selection of the source of the gas. Gas from certain production basins could have an inherently lower emissions footprint. For example, if the raw gas has fewer liquids or impurities that need to be removed through processing it would reduce the processing-related emissions. Similarly, if the source of the gas is physically closer to the utility, the energy and emissions required for transportation could be lower.

The other approach is through the selection of providers that have implemented measurable and verifiable emission reduction technologies and processes. The main focus currently is on gas producers that are implementing the use of technologies and processes to reduce the emissions associated with their gas production, but similar measures including direct reduction of methane emissions as well as measures to reduce the release of CO_2 from processing plants and reducing energy consumption and related CO_2

emissions can be applied across the value chain to include gathering, processing, and transportation.

The ONE Future Coalition represents one example of the industry working together to reduce value chain methane emissions. This coalition consists of 50 member companies with a mission focused on reducing methane emissions across the entire supply chain by means of an innovative, flexible, and performance-based approach. The approach is a specific, measurable goal to reduce overall supply chain methane emissions intensity (total CH_4 emissions divided by gross production) to 1% or less by 2025. The ONE Future production segment target is 0.28%. The results to date in ONE Future's 2019 methane emission intensities report indicate that reduction efforts of members are resulting in rates better than the 2025 target and that additional reductions are achievable when compared to the 2019 national average.[2]

Q. HOW CAN EMISSIONS BE MEASURED AND VERIFIED?

A. There are currently multiple protocols for RSG certification. Two of the major certification standards available in the market measure and verify gas-associated emissions, each entity with a different approach. Project Canary, an International Environmental Standards (IES) company, certifies RSG through their TrustWell™ certification process. This certification provides RSG buyers with a third-party validation of the emissions performance of the gas purchased and verifies that "the operator has utilized the highest standards and practices in all phases of their operations."[3] Every facility

[2] ONE Future (May-19-2021) "ONE Future 2020 Methane Emission Intensities Report." Retrieved from: https://onefuture.us/wp-content/uploads/2021/05/ONE-Future-2020-Final-Report-051921-print.pdf

[3] Project Canary (Feb-1-2021) Opportunities and Strategies to Reduce Methane Emissions for Natural Gas Utilities. Presentation to the Colorado PUC Commissioners' Information Meeting (CIM) No. 20M-0439G https://drive.google.com/file/d/1a9yKV_vt_Y7P710kN2USzBxWNGnwTQYW/view?usp=sharing

that is validated is rated and benchmarked against IES' performance data of other facilities and rated based on the TrustWell™ performance rating.[4]

RMI and SYSTEMIQ certify a low methane gas standard through their MiQ (Methane Intelligence) certification. In order to achieve certification, a facility must demonstrate performance on an A to F grading scale against three performance criteria: methane intensity, monitoring technology deployment, and company practices.[5]

Other certification programs do not rely on the measurement and verification of gas associated emissions. One such RSG certifier is Equitable Origin that provides their EO100™ Standard for Responsible Energy Development. This certification covers broad categories following five principles: corporate governance, transparency & ethics; human rights, social impact & community development; indigenous people's rights; fair labor & working conditions; and climate change, biodiversity & environment. The process to acquire this certification, includes, among other requirements, the quantification and disclosure of Scope 1 emissions following international reporting protocols such as the IPCC and Climate Disclosure Project ("CDP").[6]

The Gas Technology Institute (GTI) is also working on an initiative focused on standards for RSG called Project Veritas. This initiative is not a certification. Project

[4] Canary Project (Sep-2020), TrustWell™ Standard Definitional Document. Retrieved from: https://www.projectcanary.com/wp-content/uploads/2021/01/IES-TrustWell-Ratings-Definition-Doc.pdf

[5] MiQ (Feb-1-2021) "The Standard for Methane Emissions Abatement. Presentation to the Colorado PUC Commissioners' Information Meeting (CIM) No. 20M-0439G" https://drive.google.com/file/d/1TV1OWtwrir32mbDAyyczGaPJY1nnvH9S/view?usp=sharing

[6] Equitable Origin (2017) "EQ100™ Standard for Responsible Energy Development." Retrieved from: https://energystandards.org/wp-content/uploads/2020/10/EO100-Standard-for-Responsible-Energy-Development_2017_PT.pdf

Veritas aims to develop standard measurement methodologies that could be use by certifiers.[7]

Q. ARE GAS UTILITIES ALREADY USING RSG?

A. Many gas utilities I have spoken to or worked with are having discussions with their suppliers to understand the opportunity to procure RSG. Based on these discussions, and on our review of public information on this topic, I understand that there are additional utilities and natural gas consumers that are also considering RSG. Some are at an early stage, while others have launched formal Request for Information ("RFI") processes to get specific details from their suppliers.

A number of gas utilities have already started using RSG. In 2018 New Jersey Natural Gas (NJNG) acquired certified gas that was produced by Southwestern Energy (SWN) and certified by IES's TrustWell™.[8] In 2019, Virginia Natural Gas (VNG) began purchasing 20% of the company gas customers' annual consumption from SWN as well.[9] In 2020, Energir and Vermont Gas (VGS) procured 15%[10] and 10%[11] of their natural gas, respectively, to be Equitable Origin EO100™ certified RSG from Seven Generations

[7] GTI (2021) "A GTI Differentiated Gas Measurement and Verification Initiative." Retrieved from: https://www.gti.energy/veritas-a-gti-differentiated-gas-measurement-and-verification-initiative/

[8] NGI (Apr-8-2019) "More Buyers Stepping Forward to Pay Premium for 'Responsibly' Produced Natural Gas." Retrieved from https://www.naturalgasintel.com/more-buyers-stepping-forward-to-pay-premium-for-responsibly-produced-natural-gas/

[9] VNG (Oct-24-2019) "VNG Raises the Bar on Lowering Emissions." Retrieved from: https://www.virginianaturalgas.com/company/press-room/virginia-natural-gas-raises-the-bar-on-lowering-emissions--signs.html

[10] Energir (2020) "Climate Resiliency Report." Retrieved from: https://www.energir.com/~/media/Files/Corporatif/Dev%20durable/2020-Energir-Climate-Resiliency-Report.pdf?la=en

[11] VGS (Nov-10-2020) "VGS Takes Next Step in Journey to Net Zero with Partnership to Purchase Responsibly Sourced Natural Gas." Retrieved from: https://www.vermontgas.com/vgs-takes-next-step-in-journey-to-net-zero-with-partnership-to-purchase-responsibly-sourced-natural-gas/

Energy.[12] More recently, on March 2021, Colorado Springs Utilities announced the company will be part of a pilot project to deliver TrustWell™ RSG across the value chain. Colorado Springs Utilities will purchase the certified RSG produced by Baywater Exploration & Production; gathered and processed by Rimrock Energy Partners, a midstream services provider in the DJ Basin; and finally, the gas will be transported by Colorado Interstate Gas Company, a Kinder Morgan Inc. subsidiary, to Colorado Springs Utilities.[13] Additionally, on May 2021, Xcel expressed interest in seeking to minimize upstream supply-chain methane emissions by purchasing RSG and announced a pilot project to purchase RSG certified by IES's TrustWell™ from Crestone Peak Resources.[14] It is expected that more utilities will procure RSG as more gas producers commit to complete RSG certification processes, and midstream natural gas operators have announced their intentions to dedicate capacity to transport certified gas to end-users.

Q. HOW IS RSG TRACKED AND DELIVERED?

A. In general, the natural gas industry does not track specific molecules across the value chain, just as the electricity industry does not track individual electrons. Both industries rely on accounting frameworks in which energy is added to the system at various points and withdrawn from the system at various points and buyers and sellers account for the volumes independent of the actual molecules they inject or receive. Utilities also secure

[12] Equitable Origin (Nov-11-2019) "Certification of Seven Generations Energy' Kakwa River Project." Retrieved from: https://energystandards.org/wp-content/uploads/2020/02/EO100-Certification-Summary_SevenGenerations_11NOV2019.pdf

[13] Kinder Morgan (Mar-11-2021) "Colorado Energy Organizations Launch First-of-its-Kind Responsibly Sourced Gas Partnership." Retrieved from: https://ir.kindermorgan.com/news/news-details/2021/Colorado-Energy-Organizations-Launch-First-of-its-Kind--Responsibly-Sourced-Natural-Gas-Partnership/default.aspx

[14] Crestone Peak (May-12-2021) "Xcel Energy, Crestone Peak Resources and Project Canary Form Certified Low-Emission Intensity Natural Gas Partnership Program." Retrieved from: https://www.crestonepeakresources.com/xcel-energy-crestone-peak-resources-and-project-canary-form-certified-low-emission-intensity-natural-gas-partnership-program/

transportation contracts for pipeline capacity to move the purchased gas (regardless of specific molecules) between specified delivery points to get the gas to their system. This is how conventional gas is bought and sold and is also used for the sale of renewable natural gas (see below) as a differentiated commodity within the natural gas system. The same system is being used for RSG.

Q. HOW MUCH DOES RSG COST?

A. Although some utilities have started purchasing certified RSG, the market for RSG is still in its early stages. Most of the utilities that have purchased RSG to-date have not disclosed details on the incremental costs of RSG.

Some of the first utilities buying RSG for their customers have acquired the certified gas at essentially negligible incremental cost. As noted earlier, gas from certain producing regions can have an inherently lower emissions footprint, and some producers may already meet the RSG requirements, without having previously been certified. For example, if demand for RSG is low, and a utility is already procuring gas from regions that include low-cost RSG options, the cost premium to acquire that RSG may be minimal. That being said, as this market evolves, we expect there will continue to be a wide range of costs to produce RSG, and we expect there will be changes in the prices utilities pay for RSG as demand grows and there is increased competition for this supply.

In terms of RSG cost information that is available, in their rate case filings, Energir initially estimated a bill impact for a typical residential customer of less than $2 CAD (~$1.6 USD) per year, around a 0.11% increase, from their planned supply shift to 20%

RSG. [15] VGS estimated a bill impact of an average residential customer's heating bill of 15 cents per month from the shift of 10% of their supply to RSG.[16] On March 31, 2021, testimony related to RSG at the Colorado PUC, Xcel indicated their expectation for certified RSG to come with a cost premium in the range of $0.10 to $0.20 per MMBtu. Xcel has subsequently completed an RFI to request more specific cost estimates from producers.[17] In another presentation as part of that Colorado proceeding, the RSG certification firm TrustWell™, provided an example showing RSG with a potential $31.48 / tCO_2e emission reduction cost, based on an incremental cost of $0.05 / MMBtu for RSG.[18]

Q. HOW MUCH RSG IS AVAILABLE?

A. Although interest from gas utilities in RSG is growing rapidly, it is still a new concept in the early stages of its market cycle. As demand increases, and as certification processes are standardized, we expect to see rapid growth in the availability of RSG. A Platts survey[19] of RSG certifiers indicated that, as of October 2021, companies had committed to certifying nearly 7 Bcf/d of production and an additional 5.3 Bcf/d was anticipated to become available in 2022. That represents 12.3 Bcf/d, or around 14% of U.S,

[15] Quebec Regie De L'Energie (Nov-7-2019) "Décision sur le fond Demande d'approbation du plan d'approvisionnement et de modification des Conditions de service et Tarif d'Énergir (D-2019-141)" Retrieved from: http://publicsde.regie-energie.qc.ca/projets/489/DocPrj/R-4076-2018-A-0078-Dec-Dec-2019_11_07.pdf [paragraph 214]

[16] VGS (Nov-10-2020) "VGS Takes Next Step in Journey to Net Zero with Partnership to Purchase Responsibly Sourced Natural Gas." Retrieved from: https://www.vermontgas.com/vgs-takes-next-step-in-journey-to-net-zero-with-partnership-to-purchase-responsibly-sourced-natural-gas/

[17] Application of Public Service Company of Colorado (Subsidiary of Xcel Energy) for Approval of its 2021 ERP and CEP, Hearing Exhibit 102, Direct Testimony. Proceeding: 21A-0141E. Retrieved from: https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_session_id=&p_fil=G_774545

[18] Project Canary (Feb-1-2021) Opportunities and Strategies to Reduce Methane Emissions for Natural Gas Utilities. Presentation to the Colorado PUC Commissioners' Information Meeting (CIM) No. 20M-0439G https://drive.google.com/file/d/1a9yKV_vt_Y7P710kN2USzBxWNGnwTQYW/view?usp=sharing

[19] S&P Global (Oct-14-2021) Certified natural gas: Midstream sector begins embracing concept, standards. Retrieved from: https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/101421-certified-natural-gas-midstream-sector-begins-embracing-concept-standards

gas production, and Platts indicated that this total does not include some pilot projects that did not disclose their size.

Some of the gas producers who are offering an RSG product, are looking to have gas they produce certified, or that have expressed interest in certified gas include: Southwestern Energy (SWN), EQT, UP Energy, Seven Generations Energy, Rimrock Energy Partners, Crestone Peak Resources, PureWest Energy, Chesapeake Energy, Northeast Natural Energy (NNE), Exxon-Mobil, and Seneca Resources Company, LLC (Seneca).[20] [21] [22] [23] [24]

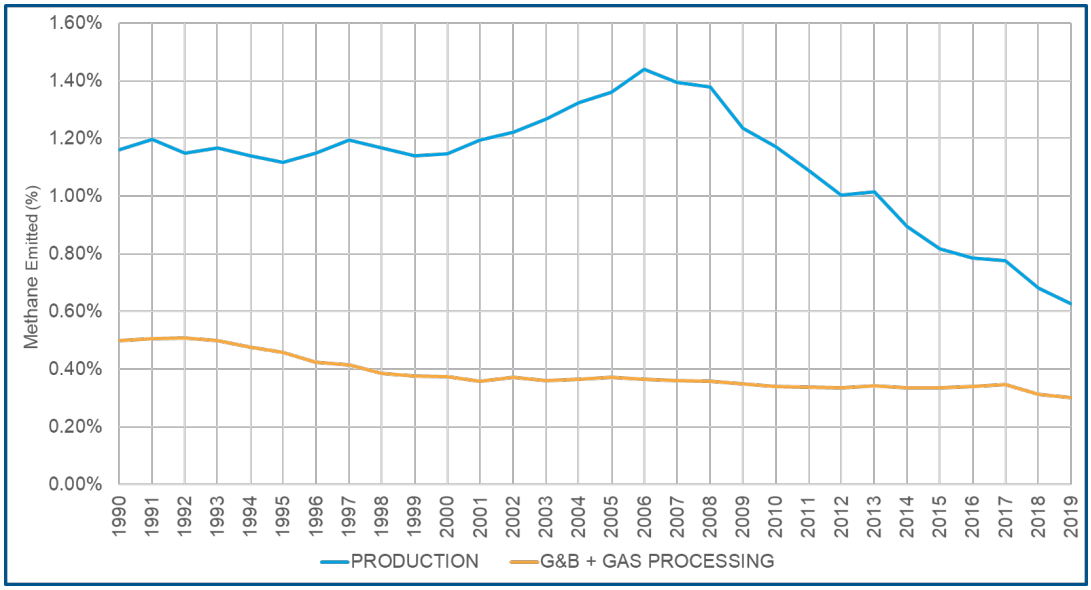
Some of pipeline companies already offering RSG, looking to have gas they transport certified, or that have expressed interest in certified gas include Ruby pipeline,[25] DT Midstream, Tallgrass Energy, and Kinder Morgan, and Williams pipelines.[26]

Q. HOW MIGHT METHANE POLICY AND REGULATION AFFECT RSG?

A. The EPA's tracking of methane emissions related to the natural gas industry shows significant reductions since 1990.

[20] Ibid
[21] EQT (Jan-28-2021) "EQT and project Canary Partner on Certified Responsibly Sourced Natural Gas Pilot." Retrieved from: https://ir.eqt.com/investor-relations/news/news-release-details/2021/EQT-and-Project-Canary-Partner-on-Certified-Responsibly-Sourced-Natural-Gas-Pilot/default.aspx
[22] Hart Energy (Jul-7-2021) Energy ESG: PureWest Energy CEO on Becoming the "Supplier of Choice" Retrieved from: https://www.projectcanary.com/energy-esg-purewest-energy-ceo-on-becoming-the-supplier-of-choice/
[23] MiQ (Jul-14-2021) Chesapeake Energy Corporation Announces New Collaboration with MiQ and Equitable Origin. https://miq.org/news/chesapeake-energy-corporation-announces-new-collaboration-with-miq-and-equitable-origin/
[24] ExxonMobil (Sep-7-2021) "ExxonMobil to Certify Natural Gas, Help Customers Meet Environmental Goals." Retrieved form: https://corporate.exxonmobil.com/News/Newsroom/News-releases/2021/0907_ExxonMobil-to-certify-natural-gas-help-customers-meet-environmental-goals
[25] Pembina (Dec-14-2020) Pembina Pipeline Corporation Announces 2021 Guidance and Provides Business Update. Retrieved from: https://www.pembina.com/media-centre/news/details/135489/#:~:text=Ruby%20has%20served%20as%20a%20reliable%20source%20of,Northwest%20region%2C%20providing%20optimism%20for%20its%20future%20value
[26] S&P Global (Oct-14-2021) Certified natural gas: Midstream sector begins embracing concept, standards. Retrieved from: https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/101421-certified-natural-gas-midstream-sector-begins-embracing-concept-standards

METHANE EMISSIONS FROM GAS PRODUCTION AND PROCESSING



Source: US EPA Inventory, EIA Statistics

This is the result of normal equipment turnover, voluntary emission reduction actions, and state and federal regulation. The use of RSG has value to the extent that it is below the average industry emissions subject to these forces. Meaningful methane emissions regulations could serve to reduce emissions across the natural gas supply chain, potentially reducing the level of reductions achieved through the specific use of RSG, but also creates the potential to reduce the average emissions and therefore reduce RSG cost premiums.

Q. WHAT IS RNG AND HOW DOES IT DIFFER FROM RSG?

A. As discussed above, RSG is geologic natural gas that has been certified to meet certain environmental performance criteria. RNG is a sustainable alternative fuel created by capturing and upgrading methane from new or existing waste streams (e.g., landfills, farms, food waste etc.) and new processes that produce methane from biomass or other renewable sources. Depending largely on the feedstock, RNG can be considered CO_2-

neutral or CO_2-negative. On a lifecycle basis, in cases where methane would otherwise be released to the atmosphere (e.g., open lagoons), RNG can have a negative carbon impact because methane is a substantially more potent greenhouse gas than the carbon dioxide created when it is burned. RNG is considered CO_2-neutral by the EPA GHG and state inventories and in GHG trading programs such as RGGI, the California cap and trade program, and the EU trading program. There can still be upstream emissions of methane from RNG, which have a climate effect, but the combustion of the RNG itself is generally considered to be CO_2-neutral since it is derived from biogenic sources.

The environmental benefits of RSG and RNG are fundamentally different. RNG is generally considered CO_2-neutral at the point of combustion (Scope 1). There can still be upstream methane emissions from processing and transportation of RNG to be accounted for. RSG addresses the upstream emissions but does not change the emissions from combustion, which is the larger component. The CO_2- benefits of RNG can apply to gas consumed directly by the utility or to emissions from customer use of gas.

Q. IF RNG IS A CO_2-NEUTRAL FUEL SOURCE, WHY THE NEED FOR RSG?

A. As discussed above, RNG and RSG have different environmental benefits. In addition, the availability of RNG is currently limited by the amount of these resources being developed and connected to natural gas pipelines. Currently, most of the available RNG is sold into the transportation market, where it has a higher market value.

However, new RNG resources and technologies are being developed and connected and over time we expect that RNG will be an increasing and substantial source for gas supply. For now, procuring RSG provides companies with an immediate and readily

available opportunity to reduce upstream GHG emissions at a lower incremental cost than other decarbonization options without modifying its existing natural gas infrastructure.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

PETER NARBAITZ, P.ENG., M.B.A.

Senior Manager, Energy Markets - Gas

Peter Narbaitz specializes in supporting natural gas and electric utilities with strategic planning related to decarbonization, climate policy, and energy efficiency. He is a leading advisor to utilities on existing and emerging opportunities to leverage gas infrastructure in support of emission reduction targets.

Mr. Narbaitz is currently working with several gas utilities and integrated utility/energy companies (electric distribution, electric generation, gas distribution) to help them understand their GHG emissions profiles (scope 1, 2, and 3), assess opportunities to reduce these emissions, and develop internal strategies and external corporate emission reduction targets. He is also currently supporting a national trade association in studying opportunities that leverage gas infrastructure to achieve emission reductions. Mr. Narbaitz regularly works with gas utilities to study emission reduction opportunities in their service territories, develop electrification and decarbonization scenarios, assess their impact on energy demand, and model the potential impacts to utilities and ratepayers.

Based out of Ottawa, Canada, Mr. Narbaitz has a strong understanding of North American energy markets. He has an MBA and a bachelor's degree in mechanical engineering, and is a licensed professional engineer in Ontario.

Years of Experience

- ICF start date: 07/2011

Education

- B.A.Sc. Mechanical Engineering (Co-Op), University of Ottawa, 2010
- M.B.A., University of Ottawa, 2018

Professional Memberships

- Professional Engineers of Ontario (PEO)

Certifications/Other

- Licensed Professional Engineer (P.Eng.), Province of Ontario, 2016

Project Experience

Selected Natural Gas Markets and Decarbonization Support for Utilities

GHG Emission Reduction Quantification and Strategy — New Mexico Gas Company, 2021 – Present.

Mr. Narbaitz is the project manager for ICF's on-going support quantifying the benefits of previously approved emission reduction opportunities, studying additional emission reduction opportunities for inclusion in an up-coming rate case, and the development of a broader decarbonization strategy.

Development of a Corporate Target for Scope 1 Emissions Reductions — Confidential Gas Utility, 2021.

Mr. Narbaitz led a recent project for a U.S. gas utility where ICF quantified their scope 1 emissions, developed a reference case for those emissions, assessed potential emission reduction opportunities, and worked with company senior leadership to consider different options for a corporate scope 1 emissions reduction target.

Utility Decarbonization & RNG Strategy — Confidential Gas Utility, 2020-2021.

Mr. Narbaitz supported the development of decarbonization strategy and RNG strategy for a gas utility with service territories spanning multiple states, with very different geographic and political

landscapes. The project included an assessment of opportunities to reduce Scope 1, 2, and 3 emissions, working with the utility to develop a plan to reach the company's public emission reduction targets, and an assessment of RNG potential and costs in the utility service territories.

CO2 and Methane Reduction Scenarios — Confidential Energy Company, 2020-2021.

Mr. Narbaitz supported the development of a decarbonization strategy and plan for a large integrated utility and energy company (electric distribution, electric generation, gas distribution). The project included an assessment of the impacts of different deep decarbonization scenarios for 2050 and opportunities to reduce Scope 1, 2, and 3 emissions for the company.

RNG Assessment & Strategy — Confidential Gas Utility, 2020.

Mr. Narbaitz supported a project for a U.S. gas utility assessing RNG potential and costs in their service territory, studying and helping prioritize potential regulatory and policy pathways to pursue RNG adoption, and putting RNG in context of other decarbonization opportunities.

Due Diligence Support for Gas Utility Acquisition — Confidential Infrastructure Fund, 2020.

Mr. Narbaitz led a study of decarbonization policy risks and opportunities as part of the due diligence review for an investor considering a potential gas utility acquisition.

Climate Business Plan — Washington Gas, District of Columbia, 2019 – 2020.

Mr. Narbaitz supported Washington Gas in the development of their Climate Business Plan, showing how the utility can support the District of Columbia's 2050 target of carbon neutrality through a combination of energy efficiency, electrification, and low carbon fuels. More recently, Mr. Narbaitz has also supported written testimony responding to questions on WGL's Climate Business Plan.

Implications of Policy Driven Electrification in Canada, Canadian Gas Association, 2019

Mr. Narbaitz was the project manager of ICF's analysis of the impacts of widespread electrification of fossil fuels, including the residential, commercial, industrial, and transportation sectors. The study looked at a number of scenarios out to 2050, to better understand the impact of different assumptions for the levels of energy efficiency improvements, electric vehicle adoption, and electric equipment performance improvements.

Beneficial Electrification Opportunity Assessments–Various Electric Utilities, 2018 – 2019.

Mr. Narbaitz worked with four electric utilities to study opportunities for them to build industrial electric load through conversion of fossil fuel fired process heating equipment to electrotechnologies. These studies include outreach to local industry as part of a market assessment, cost benefit analysis to justify priority technologies, and the development of an implementation plan for utilities to launch BE programs.

Maritimes Gas Market Workshop–Nova Scotia Department of Energy and Mines (DEM), 2019

Mr. Narbaitz was part of the ICF team developing and conducting a workshop for the Nova Scotia DEM to review the current state of play in regional gas markets, with a focused discussion on potential opportunities and strategies to ensure access to reasonably priced natural gas for the Canadian Maritimes. The workshop included a look at the province's power generation sector, and potential implications of gas supply limitations on the ability to generate adequate electricity.

Climate Strategy Submission–Ontario Energy Association, 2018.

Mr. Narbaitz engaged with the OEA's gas and electric distribution company members and wrote a white paper submitted by the OEA to the provincial government. This paper outlined how the

province got to its current state, calculated the costs associated with decisions such as renewables procurements, and showcased a number of low- & no-cost technology & regulatory opportunities (including energy efficiency) for Ontario to achieve GHG and energy cost reductions.

Non-Pipeline Solutions–Consolidated Edison, 2017 – 2018.

Mr. Narbaitz worked closely with Con Edison to evaluate different types of projects which could be used to address a pipeline capacity shortfall, without the construction of traditional infrastructure solutions. Mr. Narbaitz was then a lead author in writing Con Edison's RFP soliciting market proposals for the implementation of Non-Pipeline Solution projects. He was also involved in supporting Con Edison's review of proposals submitted to the RFP.

Business Risk Changes from Climate Policy–Confidential Gas Utility, 2017.

Mr. Narbaitz led the development of a range of electrification and fuel switching scenarios that highlight potential impacts to a utility's natural gas system out to 2050. The team worked to showcase the implications for different assets and regulated business practices under these alternative climate change policies and gas market scenarios.

Evaluation of Union Gas Avoided Costs—Union Gas, 2014 – 2015.

Union Gas engaged ICF to evaluate the existing methodology used by Union Gas to estimate the avoided costs used to evaluate Union Gas DSM programs, and to develop and implement a more comprehensive approach to determining Union Gas avoided costs. Mr. Narbaitz supported ICF's literature review, analysis, and development of the report filed with the Ontario Energy Board.

Selected Energy Efficiency Experience

Better Plants Program — U.S. Department of Energy, 2015-2020.

Mr. Narbaitz served as a Technical Account Manager in the U.S. DOE's Better Plants program, where he worked with industrial companies to achieve a 25%+ improvement in energy intensity over 10 years.

NIER Program Technical Support — Ministry of Northern Development and Mines. 2014 – 2020.

The Northern Industrial Electricity Rate (NIER) program supports large industries in Northern Ontario to improve their energy efficiency and sustainability, and ICF provides energy management expertise for the program. Mr. Narbaitz served both as a technical resource and project manager.

Assessing the GHG Abatement Potential from Energy Efficiency in the Small and Medium Ontario Industry Sector—CME & Ontario Government, 2016.

Mr. Narbaitz led the analysis and modelling for this assessment of the GHG conservation potential from small and medium industrial facilities in Ontario.

Natural Gas Conservation Potential Study—Ontario Energy Board. 2015-2016.

Mr. Narbaitz led the industrial sector analysis for this study on the opportunity for natural gas conservation in Ontario, as well as several stages of the modeling.

Assessment of Energy Efficiency in the Far North System—SaskPower. 2015.

ICF was brought in to provide SaskPower with a better understanding of the potential for energy efficiency and demand reduction measures to reliably address future constraints on an isolated northern electricity grid. Mr. Narbaitz led the analysis of potential savings and costs.

Conservation and Demand Management Study—Newfoundland Power and Newfoundland Labrador Hydro. 2014-2015.

Mr. Narbaitz was the lead for the industrial sector in this review of the potential for electricity conservation in the province of Newfoundland and Labrador.

2015-2020 CDM Plan Development—Various Ontario Local Distribution Companies, 2014-2015.

In 2014-2015, a number of Ontario local electric distribution companies hired ICF to develop their Conservation and Demand Management (CDM) plans for 2015-2020. Mr. Narbaitz's role in these projects included leading the cost-effectiveness testing efforts and developing strategies for the LDC's to meet their targets within the allotted budgets.

Study on Energy Efficiency and Energy Savings Potential in Industry and on Possible Policy Measures—European Union (EU) Director General for Energy. 2014.

In collaboration with ICF's London office, Mr. Narbaitz led the development of a library of energy efficiency opportunities for industrial sectors covering the majority of energy consumption in the EU's 28 member states. These opportunities were then used in an industrial model to characterize the industrial energy efficiency potential in the EU, and compare this to targets.

Development of Technology Roadmap on Energy Efficiency Technologies for Industry Sector—National Climate Change Secretariat of Singapore. 2013 – 2014.

Mr. Narbaitz was the lead researcher and report author for sections targeting petroleum refining and chemicals in a roadmap to guide Singapore's research, development, and deployment funding.

Continuous Resource Performance Improvement Assessment—Chinese Petrochemical Plant, 2013.

Mr. Narbaitz was part of a team that conducted resource (energy, water, GHGs) efficiency audits of an ammonia plant and a methanol plant.

Ontario Achievable Potential 2015-2020—Ontario Power Authority. 2013.

Mr. Narbaitz performed the research and stakeholder consultations for two of the industrial clusters of energy conservation measures covered in this study of achievable potential for Conservation and Demand Management (CDM) in Ontario.

Bangladesh Industrial Energy Efficiency Opportunities Assessment—USAID, 2012.

Mr. Narbaitz researched energy efficiency opportunities specific to Bangladesh, and was part of a team that performed energy audits of industrial facilities in Bangladesh.

Expert Testimony

1. Expert Witness Report "Evaluation of Union Gas Avoided Costs", December 2014, Authored by Michael D. Sloan and Peter Narbaitz, and submitted on behalf of Union Gas Limited before the Ontario Energy Board in Case No. EB-2015-0029.
2. Written reply comments of Michael D. Sloan and Peter Narbaitz, *Natural Gas and its Contribution to a Low Carbon Future,* September 25, 2020. Mr. Narbaitz contributed to written responses on behalf of Washington Gas Light Company (WGL) before the District of Columbia Public Service Commission FC1142. Mr. Narbaitz's responses concerned comments on the ICF analysis and scenarios used in the development of WGL's Climate Business Plan.

3. Written responses of Michael D. Sloan and Peter Narbaitz, *In the Matter of the Implementation of Electric and Natural Gas Climate Change Proposals,* September 1, 2021. Mr. Narbaitz contributed to written compliance responses on behalf of Washington Gas Light Company (WGL) before the District of Columbia Public Service Commission FC1167. Mr. Narbaitz's responses concerned the data and assumptions used in the development of WGL's Climate Business Plan.

Employment History

ICF. Senior Manager. 2020 – Present

ICF. Manager. 2016 – 2020

ICF. Senior Associate. 2015 – 2016

ICF. Associate. 2013 – 2015

ICF. Analyst. 2012 – 2013

ICF. Research Assistant. 2011 – 2012

Walter Meier Ltd. Engineering Designer (Student). 2009

Natural Resources Canada, ZET. Mechanical Engineering Student. 2008

Environment Canada, ECD. Engineering Student. 2008